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**BEFORE THE ARIZONA CORPORATION COMMISSION**

MIKE GLEASON, CHARIMAN  
WILLIAM A. MUNDELL  
JEFF HATCH-MILLER  
KRISTIN K. MAYES  
GARY PIERCE

IN THE MATTER OF THE APPLICATION  
OF ARIZONA PUBLIC SERVICE  
COMPANY FOR A HEARING TO  
DETERMINE THE FAIR VALUE OF THE  
UTILITY PROPERTY OF THE COMPANY  
FOR RATEMAKING PURPOSES, TO FIX A  
JUST AND REASONABLE RATE OF  
RETURN THEREON, TO APPROVE RATE  
SCHEDULES DESIGNED TO DEVELOP  
SUCH RETURN

Docket No. E-01345A-08-0172

**NOTICE OF FILING TESTIMONY**

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Western Resource Advocates ("WRA"), through its undersigned counsel, hereby  
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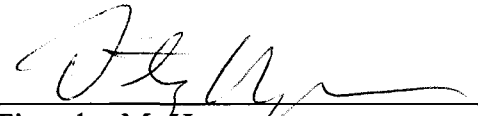
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1 DATED this 19<sup>th</sup> day of December, 2008.

2 ARIZONA CENTER FOR LAW IN  
3 THE PUBLIC INTEREST

4 By   
5 Timothy M. Hogan

6 202 E. McDowell Rd., Suite 153

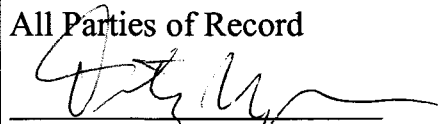
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20 All Parties of Record  
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**BEFORE THE ARIZONA CORPORATION COMMISSION**

**COMMISSIONERS**

MIKE GLEASON, Chairman  
WILLIAM A. MUNDELL  
JEFF HATCH-MILLER  
KRISTIN K. MAYES  
GARY PIERCE

IN THE MATTER OF THE APPLICATION  
OF ARIZONA PUBLIC SERVICE COMPANY  
FOR A HEARING TO DETERMINE THE  
FAIR VALUE OF THE UTILITY PROPERTY  
OF THE COMPANY FOR RATEMAKING  
PURPOSES, TO FIX A JUST AND  
REASONABLE RATE OF RETURN  
THEREON, AND TO APPROVE RATE  
SCHEDULES DESIGNED TO DEVELOP  
SUCH RETURN.

DOCKET NO. E-01345A-08-0172

**Permanent Rate Case**

**Direct Testimony of**

**Carolyn Stewart  
Red Mountain Energy Partners**

**On Behalf of**

**Western Resource Advocates**

**December 19, 2008**

**Direct Testimony of Carolyn Stewart**  
**Docket No. E-01345A-08-0172**

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**DIRECT TESTIMONY OF CAROLYN T. STEWART,  
RED MOUNTAIN ENERGY PARTNERS  
ON BEHALF OF WESTERN RESOURCE ADVOCATES**

(Docket No. E-01345A-08-0172)

**I. INTRODUCTION**

**Q. PLEASE STATE YOUR NAME AND BUSINESS ADDRESS.**

A. Carolyn T. Stewart, 2122 E. Highland Avenue, Suite 260, Phoenix, AZ 85016.

**Q. BY WHOM ARE YOU EMPLOYED AND IN WHAT CAPACITY?**

A. I am a partner and co-owner of Red Mountain Energy Partners, a consulting firm serving clients primarily in the Southwestern U.S.

**Q. ON WHOSE BEHALF ARE YOU TESTIFYING?**

A. I am testifying on behalf of Western Resource Advocates (WRA) and I have worked closely with WRA in preparing my testimony.

**Q. WHAT ARE YOUR PROFESSIONAL QUALIFICATIONS?**

A. I have more than 30 years of experience in the energy industry in the areas of utility regulatory matters, including electric utility rate development; energy strategy development; and energy project development. Prior to forming Red Mountain Energy, I served as an Associate Director at Navigant Consulting, Inc. ("NCI") in Phoenix, AZ and Chicago, IL for 8 years. Prior to joining NCI, I held various positions, over a 22-year career, at Nicor Gas, a natural gas utility serving over 2 million customers in Northern Illinois. Exhibit CTS-1 provides more detailed background information.

**Q. WHAT IS THE PURPOSE OF YOUR TESTIMONY?**

A. The purpose of my testimony is to provide an independent analysis of the expected effects of APS' proposed demand response rates, which include a residential super peak

1 time-of-use ("TOU") rate, ET-SP, and a critical peak pricing ("CPP") rate, CPP-GS<sup>1</sup>, for  
2 general service customers.  
3

## 4 **II. SUMMARY OF TESTIMONY**

### 5 **Q. PLEASE SUMMARIZE YOUR TESTIMONY.**

6 A. In my testimony, I describe demand response programs and summarize Arizona  
7 Corporation Commission Decision No. 69663 (June 28, 2007) in which the Commission  
8 ordered APS to conduct a study on demand response and to submit one or more programs  
9 based upon that study, as well as APS' response to that order. I also summarize results  
10 from analyses by others on demand response pricing programs. I then assess APS'  
11 proposed rate schedules ET-SP and CPP-GS in light of experience in other regions. I  
12 evaluate the potential attractiveness of Schedule ET-SP, review analyses of demand  
13 response and energy efficiency synergies, raise the issue of whether APS' proposed  
14 demand response rates might have adverse environmental impacts, and recommend  
15 studies to obtain more information on these issues based on APS' experience with the  
16 proposed tariffs.  
17

## 18 **III. COMMISSION DECISION NO. 69663 AND APS'** 19 **RESPONSE** 20

### 21 **Q. WHAT IS DEMAND RESPONSE?**

22 A. The Federal Energy Regulatory Commission (FERC) defines demand response as actions  
23 by customers to change their consumption of electric power in response to price signals,

---

<sup>1</sup> Charles Miessner refers to this rate as GS-CPP throughout his pre-filed testimony, although the tariff sheet indicates CPP-GS.

1 incentives, or directions from grid operators.<sup>2</sup> The FERC explains that demand response  
2 is typically an active response to prices or incentive payments. Changes in electricity use  
3 are short term and centered on critical hours of the day or year when demand is high or  
4 system reliability is jeopardized. Demand response programs are intended to reduce  
5 customer usage during these critical periods.

6 **Q. WHAT DID THE COMMISSION ORDER CONCERNING DEMAND RESPONSE**  
7 **PROGRAMS REQUIRE OF APS?**

8 A. APS was ordered to: 1) submit a Critical Peak Pricing proposal in its next rate  
9 application; and 2) conduct a study to identify what types of Demand Response and Load  
10 Management would be most beneficial to APS' system, relying on a cost-benefit analysis  
11 based on the Societal Cost Test, and file the study and one or more cost effective program  
12 proposals within one year.

13 **Q. WHAT HAS APS PROPOSED IN THIS DOCKET TO ADDRESS THE**  
14 **COMMISSION ORDER?**

15 A. APS has proposed two demand response pricing programs: 1) a residential super peak  
16 TOU rate ET-SP, and 2) a critical peak pricing program for general service customers,  
17 CPP-GS. Charles Miessner's pre-filed testimony, beginning on page 2, line 24, also  
18 indicated that APS was conducting research concerning demand response programs, but  
19 had not yet completed its studies. Its research included investigation of demand-response  
20 pricing programs offered by other utilities and independent system operators, reviews of  
21 rate schedules offered by other utilities to identify current offerings or pilot programs,  
22 and reviews of government surveys of utility demand response programs and pilot  
23 projects. On November 6, 2008, APS filed a request for approval of a commercial and

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<sup>2</sup> Federal Energy Regulatory Commission, *Assessment of Demand Response and Advanced Metering*, Staff Report, Docket AD06-2-000, August 2006, p. 5.

1 industrial demand response program using an aggregator business model (Docket No. E-  
2 01345A-08-0569).

3 **Q. PLEASE DESCRIBE APS' PROPOSED ET-SP RATE.**

4 A. A copy of Rate Schedule ET-SP is included in Exhibit CTS-2. APS' proposed ET-SP  
5 rate is composed of Off-Peak, On-Peak, and Super-Peak pricing for summer and winter  
6 seasons. The Super Peak period applies June – August and it has the highest rates. On-  
7 peak summer rates apply from May through October, and on-peak winter rates apply the  
8 rest of the year. Summer on-peak rates are higher than winter on-peak rates. Off-peak  
9 rates are lower than on-peak rates, apply year-round, and are the same in every month.  
10 The Super Peak Summer rates apply during the hours of 3 PM to 6 PM Monday through  
11 Friday. Charles Miessner indicates in his pre-filed testimony on page 9, lines 10-11, that  
12 Rate ET-SP will be available to all residential customers that are served with advanced  
13 metering ("AMI") meters.

14 **Q. PLEASE DESCRIBE APS' PROPOSED CPP-GS RATE.**

15 A. Rate schedule CPP-GS is included in Exhibit CTS-2. APS' proposed rate schedule CPP-  
16 GS provides a high price (\$0.40 per kWh) during critical hours, called by APS one day in  
17 advance that occur between 2 PM and 7 PM Monday through Friday, from June through  
18 September. Critical hours are limited to 18 days per year, 5 hours per day, and 90 hours  
19 per year. Rate CPP-GS also provides discounts for participating customers on all  
20 monthly kWh usage of between \$(0.011755) and \$(0.014892), depending on the  
21 otherwise applicable schedule.<sup>3</sup> Eligible customers must demonstrate the ability to  
22 reduce usage during critical hours by at least 200 kW, and submit a load reduction plan,  
23 which APS will approve in advance. APS is proposing to require interval metering, as  
24 well as limit participation to 100 customers for the first two years of program eligibility.

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<sup>3</sup> According to Mr. Miessner, the discounts apply only during the months of June through September (conversation December 9, 2008). The tariff should be revised to clarify the period in which discounts apply.

1

2 **IV. DEMAND RESPONSE LITERATURE REVIEW**

3 **Q. HOW DID YOU EVALUATE THE POTENTIAL IMPACTS OF APS'**  
4 **PROPOSED DEMAND RESPONSE TARIFFS?**

5 **A.** I conducted a review of the literature on experience with similar programs in other  
6 jurisdictions.

7 **Q. WHAT PRESENTATIONS AND STUDIES DID YOU REVIEW?**

8 **A.** I reviewed eight presentations of demand response programs made between 2004 and  
9 2008, and ten detailed reports on demand response programs written during the same  
10 time period. Exhibit CTS-3 summarizes each. One of the pervasive themes of the  
11 literature is the economic benefit of providing consumers with more timely and more  
12 accurate price signals reflecting the power supplier's marginal costs and the value of  
13 automated metering equipment in providing those benefits.

14 **Q. WHAT DEMAND RESPONSE PROGRAMS WERE ANALYZED IN THE**  
15 **MATERIALS YOU REVIEWED?**

16 **A.** The demand response programs studied included those conducted by electric utilities in  
17 California, the Carolinas, Florida, Georgia, Idaho, Illinois, Missouri, New Jersey, New  
18 York, Wisconsin, Ontario Canada, and Australia.

19 **Q. HOW MANY UTILITIES CURRENTLY OFFER DEMAND RESPONSE**  
20 **PROGRAMS OR TARIFFS?**

21 **A.** According to a Federal Energy Regulatory Commission ("FERC") study, item R-5 on  
22 Exhibit CTS-3, completed in 2006, more than 250 time-based rate programs were being  
23 offered. At that time, 187 utilities offered time-of-use rates, 25 utilities offered critical  
24 peak pricing tariffs or pilots, and 47 offered real-time-pricing programs. Of the time-of-  
25 use rates, 148 were offered to residential customers, and the remaining 39 were for

1 nonresidential customers. Most of the critical peak pricing program offerings were pilots.  
2 Of the 47 real time pricing programs, the majority were offered by investor-owned  
3 utilities outside of the Western Electricity Coordinating Council region.

4 **Q. HOW MANY CUSTOMERS PARTICIPATE IN DEMAND-RESPONSE**  
5 **PROGRAMS ACROSS THE U.S. TODAY?**

6 A. According to the FERC study, about five percent of US electric customers participate in  
7 demand response programs.

8 **Q. WHAT MEASURES OF EFFECTIVENESS WERE USED TO EVALUATE**  
9 **DEMAND RESPONSE PROGRAM SUCCESS?**

10 A. As summarized in Exhibit CTS-4, program effectiveness was typically measured by  
11 reductions in utility peak load. In some studies, energy usage, and customer bill impacts  
12 were also measured.

13 **Q. IS REDUCTION IN OVERALL ENERGY USAGE A MEASURE OF SUCCESS**  
14 **IN DEMAND RESPONSE PROGRAMS?**

15 A. In general, no. Demand response programs are primarily intended to reduce peak  
16 demand. A comprehensive study completed by the American Council for an Energy  
17 Efficient Economy ("ACEEE"), item R-7 in Exhibit CTS-3, found almost no published  
18 research on the issue of how demand response programs affect energy use during off-  
19 peak periods and overall building/facility use and energy efficiency.

20 **Q. DID THE FERC STUDY DISCUSS ANY ARIZONA UTILITY DEMAND**  
21 **RESPONSE PROGRAM RESULTS?**

22 A. Yes. The FERC study highlighted the time-of-use programs of APS and Salt River  
23 Project. The study cited both as "having residential participation rates that approach one-  
24 third of their customers".<sup>4</sup> According to the 2006 study, APS' residential customer

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<sup>4</sup> Federal Energy Regulatory Commission, *Assessment of Demand Response and Advanced Metering*, Staff Report, Docket AD06-2-000, August 2006, p. 55.

1 participation was 332,823. Gregory DeLizio's prefiled testimony indicates on page 26,  
2 beginning on line 1, that as of December 2007, nearly 453,000 customers were  
3 participating in a time-of-use rate. APS also indicated that in terms of percentage and  
4 total number of customers, APS had the most successful residential time-of-use program  
5 in the U.S.

6 **Q. DID ANY OF THE STUDIES PROVIDE SUMMARY DATA ON THE**  
7 **EFFECTIVENESS OF SUPER PEAK PRICING RATES?**

8 A. None of the studies I reviewed included data on rates with pre-determined Super Peak  
9 rate periods similar to proposed rate ET-SP. However, one Ameren pilot, summarized in  
10 a January 2008 Edison Electric Institute ("EEI") study, item R-1 in Exhibit CTS-3,  
11 included a time-of-use rate with three pricing tiers, but with significantly different pricing  
12 than APS has proposed. The three-tiered time-of-use rate pricing had lower differentials  
13 between off-peak, mid-peak and on-peak periods than APS has proposed, and the  
14 Ameren tariff resulted in modest (less than 1%) shifts of energy usage from mid-peak and  
15 on-peak periods to off-peak periods. A Brattle Group presentation in March 2008, item  
16 P-2 in Exhibit CTS-3, provided results that demonstrated the impact with, and without,  
17 use of advanced metering technology on time-of-use rates. This study indicated overall  
18 load reduction results achieved in four time-of-use pilots without technology from 2% to  
19 as high as 13%, and time-of-use load reduction results achieved in four pilots with  
20 automated metering technology from 18% to 32%. In Gregory DeLizio's prefiled  
21 testimony, page 35, beginning on line 23, he indicates that APS' introduction of a "super  
22 peak" rate is very analogous to critical peak pricing proposals in other jurisdictions, and  
23 may result in the same or similar impacts on peak load, which are discussed below.

24 **Q. DID ANY OF THE STUDIES PROVIDE SUMMARY DATA ON THE**  
25 **EFFECTIVENESS OF CRITICAL PEAK PRICING RATES?**

1 A. Yes. Several variations of critical peak pricing rates have been evaluated in pilots. These  
2 include a CPP-fixed rate, in which the time and duration of the price increase are pre-  
3 determined, but the days with critical events are called and are not established in advance.  
4 With CPP-variable rates, the time, duration, and day of price increases are not  
5 predetermined. The ACEEE August 2004 California pilot presentation, item P-8 in  
6 Exhibit CTS-3, the Charles River Associates report, item P-6 in Exhibit CTS-3, and the  
7 FERC study, item R-5 in Exhibit CTS-3, included results for several critical peak pricing  
8 programs evaluated in the statewide California pilot. Results varied from peak load  
9 reductions for participating customers of ~ 12% for CPP-fixed rates during critical peak  
10 events, and up to ~45% reductions for CPP-variable rates for customers with smart  
11 thermostats. Critical peak pricing program load reduction results achieved without  
12 technology were reported to reach just under 50% with the majority between 10-20%,  
13 and critical peak pricing program load reduction results achieved with technology  
14 reached over 50%, with the majority over 20%.

15 **Q. DID CRITICAL PEAK PRICING PROGRAM PEAK LOAD REDUCTION**  
16 **RESULTS VARY BY CLIMATE?**

17 A. Yes. The ACEEE August 2004 California pilot results summary indicated ~16-17% peak  
18 load reductions for CPP-fixed rate customers in Climate Zone 4, which is most  
19 comparable to Phoenix, compared with California statewide pilot program peak load  
20 reductions of 12%.

21  
22 **V. APS' PROPOSED ET-SP RATE**

23 **Q. WHAT IS SUPER PEAK TIME-OF-USE PRICING?**

1 A. Super peak time-of-use pricing is similar to typical time-of-use pricing, but includes an  
2 additional critical peak period with a higher super peak period charge per kWh used  
3 during the pre-determined super peak period.

4 **Q. HOW DOES THE APS PROPOSED ET-SP RATE COMPARE WITH APS'**  
5 **EXISTING TIME-OF-USE RATES?**

6 A. As previously summarized in my testimony, APS' proposed ET-SP rate is a typical time-  
7 of-use rate, with a designated super peak rate during certain hours in the summer. The  
8 structure of ET-SP is similar to APS' residential time-of-use Rate ET-2, but establishes a  
9 premium super peak price for weekday afternoons from 3 p.m. to 6 p.m. during June, July  
10 and August. Summer and Winter On-Peak rates are the same on the ET-2 and ET-SP  
11 tariffs. ET-SP Off-Peak rates are lower than those proposed for rate ET-2, as indicated in  
12 Exhibit CTS-5.

13 **Q. WHAT BENEFITS DOES SUPER PEAK TIME-OF-USE PRICING PROVIDE?**

14 A. If the super peak tariff is successful at shifting load away from the super peak hours, APS  
15 would be able to avoid or defer generating capacity additions and avoid expensive fuel or  
16 purchased power costs during peak periods, thereby lowering its costs and eventually  
17 lowering rates.

18 **Q. IS THE PROPOSED SUPER PEAK TIME PERIOD FROM 3-6 PM**  
19 **APPROPRIATE GIVEN HISTORICAL APS CUSTOMER PEAK LOAD USAGE?**

20 A. Yes. Exhibit CTS-6 shows that APS' retail load peaks in the late afternoon. Inspection  
21 of APS' hourly load data also indicates that the highest peak loads occur on weekdays.

22 **Q. UNDER WHAT CIRCUMSTANCES WOULD APS' PROPOSED ET-SP RATE**  
23 **BE ATTRACTIVE TO POTENTIAL PARTICIPANTS?**

24 A. For customers to find the rate attractive, it should be simple enough for the average  
25 residential customer to understand, and be likely to reduce a participant's bills if he or she  
26 reduces super peak and on-peak energy consumption. Tools available to assist customers

1 to plan, implement, and measure results would include the standard programmable  
2 thermostat, as well as required AMI equipment.

3 **Q. IS THE SPECIFIC SUPER PEAK RATE FOR ET-SP CUSTOMERS LIKELY TO**  
4 **BE ATTRACTIVE TO RESIDENTIAL CUSTOMERS?**

5 A. Obviously, customers will have to decide for themselves whether ET-SP is attractive.  
6 APS will be able to draw conclusions based on actual experience with customer  
7 subscriptions. During the peak summer months (June-August), the ability of a customer  
8 to reduce his or her bill depends on how much energy consumption can be shifted from  
9 super peak hours to other hours. The best opportunity to achieve savings comes from  
10 shifting energy usage from super peak hours to off-peak hours. WRA calculated  
11 potential bill savings attributable to rate schedule ET-SP for several patterns of electricity  
12 consumption and found that some customers who would otherwise be served under rate  
13 schedule ET-2 (as proposed) may be able to save about 1% to 3% on their annual bills  
14 (\$20 to \$60 savings per year). However, some customers might be reluctant to take  
15 service under rate schedule ET-SP due to the risk of higher bills if they do not reduce  
16 super-peak consumption sufficiently, and due to the relatively small savings if they are  
17 able to shift usage away from super peak hours.

18  
19 Clearly, we do not yet have the last word on the efficacy of APS' proposed rate design.  
20 In its response to WRA Data Request 1.16, APS indicates that it has not yet estimated the  
21 specific load shifting applicable to rate ET-SP. APS also indicated that it intends to  
22 perform a specific load response estimate for Schedule ET-SP if the rate is approved.  
23 Such a study is critically necessary and later in my testimony I recommend that the  
24 Commission order APS to prepare a study of the impacts of its demand response  
25 programs.  
26

## **VI. APS PROPOSED CPP-GS RATE**

### **Q. WHAT IS CRITICAL PEAK PRICING?**

A. Critical Peak Pricing (CPP) is a time-of-use rate that also provides a very high price during a limited number of hours on critical peak days. Customers are typically notified of the critical peak day up to one day in advance.

### **Q. PLEASE DESCRIBE APS' PROPOSED CRITICAL PEAK PRICING RATE.**

A. Under the proposed CPP-GS rate, eligible general service customers would pay a high price for energy use during critical hours as called by the Company with one day's notice. Critical hours would be limited to 90 hours per year, 5 hours per day, and 18 hours per year, only on weekdays from June through September. To make the rate attractive to commercial and industrial customers, discounts would be available for all kWh usage during the period from June through September, as indicated in Exhibit CTS – 2.

### **Q. WHAT INFERENCES DO YOU DRAW FROM THE LITERATURE ON THE POTENTIAL EFFECTIVENESS OF APS' CRITICAL PEAK PRICING PROGRAM?**

A. Based on the experience in other jurisdictions, I expect that APS' critical peak pricing program would shift significant load away from critical peak hours. But, in general, I would expect the critical peak pricing program, by itself, to save little or no energy over the summer overall.

### **Q. WHAT BENEFITS COULD APS' PROPOSED CPP-GS RATE PROVIDE?**

A. In Charles Miessner's prefiled testimony, page 11, lines 3-7, APS indicates that participating customers could reduce their bills, if they reduce usage during critical hours, since they would avoid paying the critical peak price, and would receive a monthly discount on all usage. If the critical peak pricing pilot is successful, APS would be able to avoid or defer generating capacity additions and avoid expensive fuel or purchased power costs during peak periods, thereby lowering its costs and eventually lowering rates.

1   **Q.    WHY IS APS RESTRICTING PARTICIPATION IN THE CPP-GS PILOT?**

2   A.    APS indicates that since the rate concept is new to APS and relatively new to the  
3       industry, and that since there has been little or no experience with critical peak pricing  
4       programs on a large scale basis, APS intends to limit participation initially to allow it to  
5       assess uncertainties and test the viability of the pilot.

6   **Q.    WHAT WOULD HAPPEN IF MORE THAN THE ALLOWED MAXIMUM**  
7       **NUMBER OF CUSTOMERS WANTED TO PARTICIPATE?**

8   A.    APS has proposed that it be able to expand participation at its discretion, with notification  
9       to the Commission. I believe this is a reasonable approach, and that limiting the number  
10      of customers has several advantages: 1) APS limits revenue losses and other risks due to  
11      unknown events, and 2) adverse environmental impacts (if any) would be limited.

12  
13   **VII.   POTENTIAL IMPACT OF PROPOSED ET-SP AND CPP-GS**  
14       **RATES ON OVERALL ENERGY CONSUMPTION**

15   **Q.    WHAT DOES EXPERIENCE ELSEWHERE INDICATE ABOUT THE IMPACT**  
16       **OF DEMAND RESPONSE PROGRAMS ON OVERALL ENERGY USAGE?**

17   A.    The California pilot results reported in 2005 by Charles River Associates, item R-6 in  
18       Exhibit CTS-3, indicated that the critical peak pricing tariff did not have a measurable  
19       effect on overall energy use of participants. This would suggest that in the California  
20       study, demand response rates may have achieved peak load reductions, but did not result  
21       in lowering overall energy use.

22   **Q.    ARE ENERGY EFFICIENCY AND DEMAND RESPONSE RELATED?**

23   A.    Energy Efficiency programs and Demand Response programs are both considered to be  
24       components of Demand Side-Management, as described in David Pickles' prefiled  
25       testimony, page 2, line 24. But, as mentioned previously, ACEEE found almost no

published research on the issue of how demand response programs affect energy use during off-peak periods, and on overall building/facility use and energy efficiency.

**Q. WHY AREN'T DEMAND RESPONSE PROGRAM RESULTS MEASURED IN THE SAME MANNER AS ENERGY EFFICIENCY PROGRAMS?**

A. Demand Response programs are focused on reducing customer demand during times of system reliability concerns or high fuel and purchased power costs. Energy efficiency programs target reductions in overall energy use – not just during peak periods. Both programs measure effectiveness of their intended results, although both have the potential to provide additional benefits.

**Q. WHAT DOES ACEEE SUGGEST ABOUT THE RELATIONSHIP BETWEEN ENERGY EFFICIENCY AND DEMAND RESPONSE PROGRAMS?**

A. ACEEE indicates that understanding the relationship between the two types of programs is vitally important, as there may be potential synergies, as well as potential conflicts between them.

**Q. WHAT POTENTIAL SYNERGIES EXIST BETWEEN ENERGY EFFICIENCY AND DEMAND RESPONSE?**

A. ACEEE found the following:

- Pursuing energy efficiency and demand response together creates an opportunity to reduce demand permanently, at peak as well as non-peak times
- Identifying peak-demand reduction opportunities can help identify inefficient and nonessential energy usage that could be reduced at other times
- Technologies that enable demand response can also be used effectively to manage energy use year-round
- Experience from demand response activities can lead to greater awareness of energy savings opportunities through improved energy efficiency

- Customers that participate in demand response programs may be prime candidates for participating in other types of demand side management programs, such as energy efficiency programs
- Program marketing could be more effective at communicating with customers about their energy use by addressing integrated approaches to energy management, and
- Participating in a demand response program, particularly one that features monitoring and control equipment, helps customers better understand their energy use and associated costs, and that process may help encourage additional actions to reduce energy use and costs.<sup>5</sup>

**Q. WHAT DOES ACEEE SUGGEST ABOUT DESIGNING SYSTEMS TO TARGET BOTH DEMAND RESPONSE AND ENERGY EFFICIENCY?**

A. ACEEE believes that programs can be designed to target both demand response and energy efficiency by promoting technologies that work to achieve both goals. Also, with coordinated program designs across programs, customers can benefit from integrated solutions to their needs.<sup>6</sup>

**Q. WHAT DOES ACEEE RECOMMEND TO PROMOTE EFFECTIVE ENERGY EFFICIENCY AND DEMAND RESPONSE PROGRAMS?**

A. ACEEE makes two major recommendations for policymakers, regulators, and researchers interested in furthering effective demand-side policies and programs: 1) give a high priority to research on the effects of demand response programs on overall energy usage;

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<sup>5</sup> American Council for an Energy Efficient Economy, *Exploring the Relationship Between Demand Response and Energy Efficiency: A Review of Experience and Discussion of Key Issues*, March 2005, p. vi.

<sup>6</sup> American Council for an Energy Efficient Economy, *Exploring the Relationship Between Demand Response and Energy Efficiency: A Review of Experience and Discussion of Key Issues*, March 2005, p. vi – vii.

1 and 2) give a high priority to designing and testing programs that explicitly combine  
2 demand response and energy efficiency objectives.<sup>7</sup>  
3

## 4 **VIII. ENVIRONMENTAL EFFECTS OF PROPOSED ET-SP AND** 5 **CPP-GS RATES**

6 **Q. WHAT ENVIRONMENTAL BENEFITS DOES APS SUGGEST WILL BE**  
7 **PROVIDED BY ITS PROPOSED ET-SP AND CPP- GS RATES?**

8 A. APS does not indicate that its proposed ET-SP and CPP- GS rates were expected to  
9 provide any environmental benefits.

10 **Q. CONVERSELY, DOES APS HAVE ANY STUDIES TO SUGGEST THAT SHIFTS**  
11 **OF CUSTOMER LOAD FROM PEAK PERIODS COULD RESULT IN A**  
12 **CHANGE IN CARBON DIOXIDE EMISSIONS?**

13 A. No. In its response to WRA Data Request 1.16, APS indicates that it has not prepared  
14 any studies to definitively quantify potential environmental impacts. However, the US  
15 EPA study completed in July 2006, item R-4 in Exhibit CTS-3, suggests two scenarios  
16 where demand response programs could affect emissions, either of which could occur at  
17 APS:

18 ➤ Scenario 1: On-peak generation is cleaner than off-peak generation – on-peak  
19 generation uses natural gas with relatively low emissions while off-peak  
20 generation uses coal with relatively high emissions. Load shifting in this case  
21 increases emissions, even though total kWh output remains the same.

22 ➤ Scenario 2: On-peak generation is dirtier than off-peak generation. Suppose the  
23 last dispatched on-peak generation unit is a combustion turbine with relatively  
24 high emissions and the last dispatched off-peak generation unit is a new combined

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<sup>7</sup> American Council for an Energy Efficient Economy, *Exploring the Relationship Between Demand Response and Energy Efficiency: A Review of Experience and Discussion of Key Issues*, March 2005, p. v.

1 cycle gas turbine with relatively low emissions. Load shifting in this case reduces  
2 emissions even though total kWh output remains the same.<sup>8</sup>

3 **Q. HOW COULD SHIFTS FROM PEAK PERIODS TO OFF-PEAK PERIODS**  
4 **HARM THE ENVIRONMENT?**

5 A. If enough load were shifted from on-peak to off-peak periods, and the generation sources  
6 utilized during off-peak periods had greater air emissions such as sulfur dioxide, nitrogen  
7 oxides, carbon dioxide, particulate matter, or mercury, there could be detrimental impacts  
8 on the environment. In its response to WRA data request 1.16, APS indicated that: 1)  
9 natural gas-fired combustion turbines are typically the marginal generating units during  
10 super peak hours, 2) during other on-peak hours and summer off-peak hours, natural gas-  
11 fired combined cycle units are APS' marginal plants, 3) during non-summer months,  
12 natural gas-fired combined cycle units are on the margin during on-peak hours, and 4)  
13 during non-summer off-peak periods, coal units and natural gas-fired combined cycle  
14 units are APS' marginal units. A summary of Arizona power plant emissions is included  
15 in Exhibit CTS – 7, which indicates that gas-fired generation is cleaner than coal-fired  
16 generation. At this time, we do not have conclusive information on the environmental  
17 effects of APS' proposed demand response programs.

18 **Q. HOW CAN THE COMMISSION GET BETTER INFORMATION ON THE**  
19 **ENVIRONMENTAL IMPACTS OF APS' DEMAND RESPONSE PROGRAMS?**

20 A. It will be necessary for APS to analyze any shifts in electricity usage attributable to  
21 participation in the demand response programs in order to provide better information on  
22 the environmental impact of APS' demand response proposals. This could be done by  
23 comparing participant consumption patterns before and after enrollment in a demand  
24 response program, taking into account other factors affecting changes in electricity use,

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<sup>8</sup> Energy and Environmental Economics, *A Survey of Time-of-Use Pricing and Demand Response Programs*, July 2006, p. 27.

1 such as weather differences, for example. Then APS would have to determine how those  
2 changes in usage patterns affected its generation mix. Lastly, APS would have to  
3 calculate air emissions changes associated with the changes in generation mix.

4 **Q. HOW SHOULD THE COMMISSION EVALUATE THE ENVIRONMENTAL**  
5 **IMPACTS OF APS' DEMAND RESPONSE PROGRAMS?**

6 **A.** Later in my testimony I provide a recommendation regarding the Commission's review  
7 of APS' demand response programs.

8 **IX. OTHER ANTICIPATED BENEFITS OF DEMAND**  
9 **RESPONSE RATES**

10 **Q. WHAT BENEFITS ARE AVAILABLE TO UTILITIES THROUGH ADOPTION**  
11 **OF ADVANCED METERING TECHNOLOGY?**

12 **A.** In addition to supporting demand-response programs that better reflect marginal costs  
13 and reduce peak energy use to improve system reliability, Southern California Edison  
14 indicates that advanced metering technology enables utilities to manage their electricity  
15 supply in response to real-time information, and to provide consumers with more detailed  
16 use data and improved price signals. Utilities use the data from advanced metering  
17 systems to perform more accurate load forecasting, reduce spot market purchases (or sell  
18 more power to the wholesale grid), minimize energy imbalances, reduce energy waste,  
19 and improve system reliability. Utilities can also shave peak use, reducing their costs and  
20 the need for new power plants and transmission lines.<sup>9</sup> Advanced metering technology  
21 can also reduce labor costs associated with manual meter reading and provide instant  
22 information on power quality and outage detection, allowing for faster response and  
23 restoration of service.<sup>10</sup> In addition to these benefits, which should result in lower utility

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<sup>9</sup> EPA Clean Energy-Environmental Technical Forum, *Motivating Energy Efficiency with Metering Technologies*, January 22, 2008.

<sup>10</sup> EPA Clean Energy-Environment Technical Forum, *Motivating Energy Efficiency with Metering Technologies*, January 22, 2008.

costs, and ultimately lower utility rates, significant customer benefits are also expected from use of advanced metering technology.

**Q. WHAT ADDITIONAL BENEFITS ARE AVAILABLE TO CUSTOMERS THROUGH ADOPTION OF ADVANCED METERING TECHNOLOGY?**

A. With advanced metering, commercial and industrial consumers can see their energy use and energy costs in real time, allowing them to make more informed decisions about their overall energy use, and potentially diagnose solutions to equipment problems. Also, all consumers would be able to use the data to benchmark their energy use before and after the installation of energy- efficient measures such as efficient lighting technologies.

**X. RECOMMENDATIONS**

**Q. DO YOU HAVE ANY RECOMMENDATIONS REGARDING THE MARKETING OF THE SUPER PEAK AND CRITICAL PEAK PRICING PROGRAMS?**

A. Yes. The demand response programs should be offered and marketed jointly with energy efficiency programs to increase the chance that participants in the CPP-GS and ET-SP programs also save energy. By offering the demand response and energy efficiency programs together, APS will increase the benefits of its demand side management activities for both itself and its customers.

**Q. DO YOU RECOMMEND APS COMPLETE ANY FURTHER STUDIES APPLICABLE TO RATES ET-SP AND CPP-GS?**

A. I recommend that APS prepare a study on the impacts of rate schedules ET-SP and CPP-GS on the mix of power generation sources, and determine whether more coal-fired generation is used as a result of these rates. The study should include estimates of impacts of the new rate schedules on air emissions including carbon dioxide, sulfur

1 dioxide, nitrogen oxides, particulate matter, and mercury, as I described above. I also  
2 recommend that APS analyze the impacts of rate schedules ET-SP and CPP-GS on  
3 overall energy usage for participants and identify methods to better integrate its demand  
4 response and energy efficiency programs. Further, APS' study should analyze the  
5 benefits of the demand response rates, taking into account avoided or deferred generating  
6 capacity costs and fuel and other variable cost savings. These studies should be filed in  
7 Docket Control within two years of the Commission's decision in this docket.

8 **Q. WHAT SHOULD THE COMMISSION DO WITH THESE STUDIES?**

9 **A.** Within three months of APS' filing of the studies described above (or in APS' next rate  
10 case filing if that rate case is filed prior to the three month deadline), the Commission  
11 should consider the environmental impacts of the demand response programs as well as  
12 any benefits from these programs and decide whether to continue the demand response  
13 programs, modify them, freeze enrollment, or terminate the programs.

14 **Q. DOES THIS CONCLUDE YOUR DIRECT TESTIMONY?**

15 **A.** Yes.  
16  
17



## Carolyn T. Stewart

**Carolyn Stewart**  
Partner  
**Red Mountain Energy Partners/  
Red Mountain Tribal Energy**

2122 E. Highland Avenue, Suite 260  
Phoenix, AZ 85016  
Tel 602.516.7540

### Professional History

- Red Mountain Energy Partners/Red Mountain Tribal Energy, 2005 to present
- Navigant Consulting, Inc., 1997 to 2005
- Nicor Gas and Nicor Inc. 1975 - 1997
  - Director Communications, Market Intelligence, and Planning
  - Director, Governmental Relations
  - Assistance Secretary and Director Investor Relations
  - Manager, Construction/Maintenance

### Education

- Master of Business Administration, University of Chicago
- Bachelor of Science, Finance, University of Illinois

Carolyn Stewart, Partner, Red Mountain Energy Partners, brings more than twenty-five years of energy industry and consulting experience in conventional and renewable energy development, gas distribution and electric distribution operations, regulatory, corporate and business strategy, stakeholder communications, corporate governance, and gas distribution and electric distribution operations. She has represented numerous investor-owned and municipal utilities, independent renewable and conventional power developers and producers, and Indian Tribes. Today, Carolyn focuses on renewable energy feasibility and development, and is supporting energy project development efforts for both wind and solar projects, primarily in the Southwest. Prior to co-founding Red Mountain, Carolyn headed Navigant Consulting, Inc.'s energy activities in Phoenix. Previously, she held various financial, management and operating positions at Nicor Gas over a 20+ year career. She has considerable knowledge of Southwest utilities, transmission systems, and generation resources, as well as state and federal renewable requirements and incentives.

### Professional Engagements

#### Renewable Energy Solar

- » Coordinate energy project development support activities for a 3 MW solar project in New Mexico, including site control, project structure, interconnection studies, power purchase negotiations and financing. The project structure utilizes multiple tax credits, accelerated depreciation benefits, and ownership flip structures.
- » Coordinated feasibility studies for solar projects in the Southwest, including Concentrating Photovoltaic, Concentrating Solar Thermal and Photovoltaic technologies, ranging from 3 MW to 100+ MW.

#### Wind

- » Manage feasibility studies for multiple wind projects in Northeast Nebraska, to serve facility and community loads, as well to meet utility-scale power needs.
- » Coordinate energy project development partner outreach efforts for a proposed 40 - 80 MW wind project in North Central Oklahoma.

**Natural Gas**

- » Coordinated support efforts in development and permitting of a gas-fired independent power plant in the Southwest, utilizing natural gas and parabolic trough technologies. Provided expert testimony on natural gas supply and transportation issues.

**Biomass**

- » Supported biomass project development activities and bid development for an independent renewable developer in the Southwest.
- » Managed multiple studies for the Pueblo of Laguna on comprehensive Utility Authority formation and development. Coordinated grant application development to fund project implementation.

**Tribal Utility Operations/Formation**

- » Support studies associated with development of a comprehensive utility organization for a Southern California Indian Tribe, including water, wastewater, and solar power generation activities.
- » Managed implementation of Pueblo of Laguna Utility Authority administrative and utility operations activities, including interim onsite utility management and General Manager recruitment.
- » Coordinated NCI support in its assignment as interim general manager of the Aha Macav Power Service, the Tribally-owned electric and natural gas utility serving the Fort Mohave Indian Tribe in Arizona, Nevada and California. Recruited a new general manager to lead the utility and provided consulting support during the transition period.

**Other (NCI)**

- » Provided support for the U.S. Navy, as part of their Navy Utility Privatization effort, in the development of contracts and in negotiations with bidders for natural gas properties.
- » Coordinated ongoing oversight of precedent-setting Federal Trade Commission-directed easement agreement between a Midwest natural gas utility and wholesale/retail energy merchant to ensure competitive conditions in a gas/electric merger.
- » Supported a Midwest gas & electric utility's efforts to prepare filings in support of its customer choice program. Coordinated rate design and terms and conditions modifications for a new small commercial customer class.
- » Coordinated NCI support efforts on behalf of a Canadian gas & electric Crown Corporation working to influence the integration of its LDC acquisition, specifically as related to the company's efforts to provide additional regulated gas supply offerings.
- » Managed development and implementation of service and rate unbundling strategies for a Midwest municipal gas utility. Coordinated all aspects of comprehensive regulatory filing and choice program development, including case strategy, expert testimony development, development of new tariff and terms and conditions, external benchmarking, internal capability assessments, information system evaluations and stakeholder communication plans and implementation.

**Carolyn T. Stewart**

- » Assisted an internal executive strategic planning team of an Eastern gas & electric utility in its consideration of implications, across all utility functions, of exiting the gas merchant function.
- » For an Asian electric utility, reviewed all aspects of electric regulation reform and restructuring activities in six countries, and two US cities, covering the restructuring process, existing market structure and status, pricing determination and objectives, and implications for the client.
- » Supported deregulation issues management for a Midwestern gas & electric utility with respect to retail choice, federal restructuring legislation, customer service standards, and public benefits.
- » Supported negotiations for gas delivery service between a Canadian gas utility and gas-fired generation plants, focusing on components of typical contractual arrangements.
- » Assisted a Western Pipeline Shipper Organization in providing support in response to FERC complaint involving proposed capacity allocation requirements.
- » Assisted a Midwestern gas utility in development of research focused on hedging and risk management tactics.
- » Assessed merger/acquisition and alliance partner candidates for a Midwest energy company.
- » Developed and implemented corporate and business unit strategic and business planning processes, plans and communications for a Midwest energy company.
- » Established new business development evaluation process and team and assessed new business opportunities, including domestic and international investments for a Midwest energy company.
- » Coordinated retail energy marketing studies, including evaluation of alliance and partner candidates, and market research to validate product and service offerings for a Midwest energy company.

**Expert Testimony**

- » Testified before the Arizona Power Plant and Transmission Line Siting Committee. Wellton-Mohawk Generating Facility, Docket No. L-00000Z-01-0114; Case No. 114. (2003)
- » Testified before the Arizona Corporation Commission. Wellton-Mohawk Generating Facility (2005)



**RATE SCHEDULE ET-SP  
RESIDENTIAL SERVICE TIME-OF-USE  
TIME ADVANTAGE SUPER PEAK 7PM-NOON**

**AVAILABILITY**

This rate schedule is available in all territory served by the Company at all points where facilities of adequate capacity and the required phase and suitable voltage are adjacent to the sites served. Additionally, this rate requires the Customer to have an Advanced Metering Infrastructure meter, or AMI, in place at time of service.

**APPLICATION**

This rate schedule is applicable to all Standard Offer electric service required for residential purposes in individual private dwellings and in individually metered apartments when such service is supplied at one site through one point of delivery and measured through one meter.

Rate selection is subject to paragraphs 3.2 through 3.5 of the Company's Schedule 1, Terms and Conditions for Standard Offer and Direct Access Services, and this rate schedule will become effective only after the Company has installed the required timed kilowatthour meter.

This schedule is not applicable to breakdown, standby, supplemental or resale service.

**TYPE OF SERVICE**

The type of service provided under this schedule will be single phase, 60 Hertz, at a single standard voltage (120/240 or 120/208 as may be selected by customer subject to availability at the customer's site). Three phase service may be furnished under the Company's Schedule 3 (Conditions Governing Extensions of Electric Distribution Lines and Services) and is required for motors of an individual rated capacity of 7-1/2 HP or more.

**RATES**

The customer's bill shall be computed at the following rates, plus any adjustments incorporated in this schedule:

**Bundled Standard Offer Service**

Basic Service Charge: \$ 0.509 per day

Energy Charge:

June – August Billing Cycles (Super Peak Summer)
\$0.49465 per kWh during Super-Peak hours, plus \$0.24465 per kWh during On-Peak hours, plus \$0.05259 per kWh during Off-Peak hours

May, September, and October Billing Cycles (Summer)	November – April Billing Cycles (Winter)
\$0.24465 per kWh during On-Peak hours, plus \$0.05259 per kWh during Off-Peak hours	\$0.19842 per kWh during On-Peak hours, plus \$0.05259 per kWh during Off-Peak hours



**RATE SCHEDULE ET-SP  
RESIDENTIAL SERVICE TIME-OF-USE  
TIME ADVANTAGE SUPER PEAK 7PM-NOON**

**RATES (cont)**

Bundled Standard Offer Service consists of the following Unbundled Components:

**Unbundled Components**

Basic Service Charge: \$ 0.227 per day

Revenue Cycle Service Charges:  
Metering \$ 0.165 per day

Meter Reading \$ 0.055 per day

Billing \$ 0.062 per day

System Benefits Charge: \$ 0.00188 per kWh

Delivery Charge: \$ 0.02222 per kWh

Generation Charge:

June – August Billing Cycles (Super Peak Summer)
\$0.47055 per kWh during Super-Peak hours, plus \$0.22055 per kWh during On-Peak hours, plus \$0.02849 per kWh during Off-Peak hours

May – October Billing Cycles (Summer)	November – April Billing Cycles (Winter)
\$0.22055 per kWh during On-Peak hours, plus \$0.02849 per kWh during Off-Peak hours	\$0.17432 per kWh during On-Peak hours, plus \$0.02849 per kWh during Off-Peak hours

**TIME PERIODS**

The Super-Peak time period is 3 p.m. to 6 p.m. and the On-Peak time period is 12 noon to 3 p.m. and 6pm to 7pm, during the Super Peak Summer months Monday through Friday excluding the holidays listed below. The On-Peak time period during Summer and Winter months for this rate schedule is 12 noon to 7 p.m. Monday through Friday excluding the holidays listed below. All hours not included in the Super-Peak or On-Peak time periods shall be Off-Peak hours for all seasons.

The following holidays are Off-Peak: New Year's Day (January 1), Memorial Day (last Monday in May), Independence Day (July 4), Labor Day (first Monday in September), Thanksgiving Day (fourth Thursday in November), and Christmas (December 25). When any holiday listed above falls on a Saturday, the preceding Friday will be recognized as an off-peak period. When any holiday listed above falls on a Sunday, the following Monday will be recognized as an off-peak period. Mountain Standard Time shall be used in the application of this rate schedule.

ARIZONA PUBLIC SERVICE COMPANY  
Phoenix, Arizona  
Filed by: David J. Rumolo  
Title: Manager, Regulation and Pricing  
Original Effective Date: xxxxx

A.C.C. No. xxxxx  
Rate Schedule ET-SP  
Revision No. Original  
Effective: xxxxx



**RATE SCHEDULE ET-SP  
RESIDENTIAL SERVICE TIME-OF-USE  
TIME ADVANTAGE SUPER PEAK 7PM-NOON**

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**ADJUSTMENTS**

1. The bill is subject to the Renewable Energy Standard as set forth in the Company's Adjustment Schedule RES pursuant to Arizona Corporation Commission Decision No. 70313.
2. The bill is subject to the Power Supply Adjustment factor as set forth in the Company's Adjustment Schedule PSA-1 pursuant to Arizona Corporation Commission Decision No. 67744 and Arizona Corporation Commission Decision No. 69663.
3. The bill is subject to the Transmission Cost Adjustment factor as set forth in the Company's Adjustment Schedule TCA-1 pursuant to Arizona Corporation Commission Decision No. XXXXX.
4. The bill is subject to the Environmental Improvement Surcharge as set forth in the Company's Adjustment Schedule EIS pursuant to Arizona Corporation Commission Decision No. XXXXX.
5. The bill is subject to the Competition Rules Compliance Charge as set forth in the Company's Adjustment Schedule CRCC-1 pursuant to Arizona Corporation Commission Decision No. 67744.
6. Direct Access customers returning to Standard Offer service may be subject to a Returning Customer Direct Access Charge as set forth in the Company's Adjustment Schedule RCDAC-1 pursuant to Arizona Corporation Commission Decision No. 67744.
7. The bill is subject to the Demand Side Management Adjustment charge as set forth in the Company's Adjustment Schedule DSMAC-1 pursuant to Arizona Corporation Commission Decision No. XXXXX.
8. The bill is subject to the applicable proportionate part of any taxes or governmental impositions which are or may in the future be assessed on the basis of gross revenues of APS and/or the price or revenue from the electric energy or service sold and/or the volume of energy generated or purchased for sale and/or sold hereunder.

**CONTRACT PERIOD**

Any applicable contract period will be set forth in APS' standard agreement for service.

**TERMS AND CONDITIONS**

Service under this rate schedule is subject to the Company's Schedule 1, Terms and Conditions for Standard Offer and Direct Access Services and the Company's Schedule 10, Terms and Conditions for Direct Access. These schedules have provisions that may affect the customer's bill. In addition, service may be subject to special terms and conditions as provided for in a customer contract or service agreement.



## RATE SCHEDULE CPP-GS CRITICAL PEAK PRICING – GENERAL SERVICE

### AVAILABILITY

This rate schedule is available in all territory served by the Company at all points where facilities of adequate capacity and the required phase and suitable voltage are adjacent to the sites served.

### APPLICATION

The Rate Schedule CPP-GS is available to retail Standard Offer customers served on Rate Schedules E-32 M, E-32 L, E-32TOU M, E-32TOU L, E-34, E-35, and E-221. The eligible customer must demonstrate the ability to reduce usage during Critical Events by a minimum of 200 kW and submit a load reduction plan, which must be approved by the Company prior to participation. The eligible customer must also have interval metering. All provisions of the Customer's otherwise applicable rate schedule will apply in addition to the charges in Schedule CPP-GS. Participation is limited to the first 100 customers for a period of two years from the initial availability. The Company may expand eligibility during this two-year period, at its discretion, upon notification to the Commission.

### RATES

<b>A. Critical Peak Price</b>		<b>\$0.40000</b>	<b>per kWh</b>
Critical Peak Price applies to kWh usage during a CPP Event.			
<b>B. Energy Discount</b>			
Rate Schedule E-32 M (401-999 kW)	\$ (0.014892)	per kWh	
Rate Schedule E-32 L (1000+ kW)	\$ (0.014438)	per kWh	
Rate Schedule E-32 TOU M (401-999 kW)	\$ (0.014892)	per kWh	
Rate Schedule E-32 TOU L (1000+ kW)	\$ (0.014438)	per kWh	
Rate Schedule E-34	\$ (0.014350)	per kWh	
Rate Schedule E-35	\$ (0.012470)	per kWh	
Rate Schedule E-221	\$ (0.011755)	per kWh	
Energy Discount applies to Customer's total monthly kWh.			

### CONDITIONS

- A. **CPP Events:** CPP Events may be invoked by the Company for the period 2 p.m. to 7 p.m., weekdays (Monday through Friday) during June through September. Holidays are excluded, which include Independence Day (July 4th) and Labor Day (first Monday in September). A CPP Event can be triggered by severe weather, high load, high wholesale prices, or a major generation or transmission outage, as determined by the Company.
- B. **Number and Duration of CPP Events:** The Company may invoke a maximum of 18 CPP Events per calendar year, for 5 hours per event and 90 hours per year.
- C. **CPP Event Notification/Communication:** Customers would be notified of a CPP Event in advance by 4:00 PM the day prior through a phone message and e-mail. Receipt of such notice is the responsibility of the participating customer.
- D. **CPP Event Cancellation:** Once a CPP event alert has been initiated, there are no conditions that would warrant the critical event to be cancelled.

**Summary of Demand Response Presentations and Reports Reviewed**

**Presentations**

Reference Number	Date	Presentation Title	Audience	Presenting Firm	Presenters	Primary Content
<b>P-1</b>	June 18, 2008	Evaluating Alternative Pricing Designs	CRRI Western Conference	The Brattle Group	R. Hledik A. Faruqui	Identified range of impacts of dynamic pricing programs
<b>P-2</b>	March 25, 2008	Dynamic Pricing – Potential and Issues	Kansas Corporation Workshop on Energy Efficiency	The Brattle Group	J. Wharton A. Faruqui	Potential impact of dynamic pricing on peak demand; value of demand response; customer price responsiveness by customer and region; how rate design makes dynamic pricing more attractive to customers
<b>P-3</b>	January 29-30, 2008	Supply and Demand Side (Electricity) Management Strategies	Turkish-American Clean Energy Conference	US DOE	L. Mansueti	US Electric Industry: demand response; peak load pricing strategies; energy efficiency;
<b>P-4</b>	January 22, 2008	EPA Clean Energy Environment Technical Forum: Motivating Energy Efficiency with Metering Technologies				Value of AMI
<b>P-5</b>	March 13, 2006	DOE's EPACT Report to Congress on Demand Response in Electricity Markets	Peak Load Management Association	US DOE	L. Mansueti	Demand Response Program Recommendations
<b>P-6</b>	May 4, 2005	California's Statewide Pricing Pilot: Overview of Key Findings	MADRI Advanced Metering Infrastructure Workshop	Charles River Associates	S. George A. Faruqui	Lessons learned from CA pilot; surprises; implications for AMI
<b>P-6</b>	August 31, 2004	Demand Response Hardware and Tariffs: California's Vision and Reality	ACEE Summer Study	California Energy Commission	A. Rosenfeld K. Herter D. Hungerford M. Jaske P. McAuliffe	Overview of summer 2003 CA pilot results
<b>P-8</b>	2003-4	California Statewide Pricing Pilot				Overview of summer 2003-4 CA pilot results

## Reports

Reference Number	Date	Report Title	Sponsor	Preparer	Personnel	Primary Content
R-1	January 2008	Quantifying the Benefits of Dynamic Pricing in the Mass Market	Edison Electric Institute	The Brattle Group	A. Faruqi L. Wood	Methodology for quantifying benefits to customers and utilities of dynamic pricing programs
R-2	May 16, 2007	The Power of Five Percent: How Dynamic Pricing Can Save \$35 Billion in Electricity Costs		The Brattle Group	A. Faruqi R. Hledick S. Newell J. Pfeifenberger	Integration of supply side and demand side approaches in achieving load reduction
R-3	July 2007	Ontario Energy Board Smart Price Pilot Final Report	Ontario Energy Board	IBM		Summary of Ontario 2006-2007 Hydro Ottawa time-based pricing structure pilot
R-4	July 2006	A Survey of Time-of-Use Pricing and Demand-Response Programs	US Environmental Protection Agency	Energy & Environmental Economics		Summary of demand response options in support of energy efficiency goals
R-5	August 2006	Assessment of Demand Response and Advanced Metering	Federal Energy Regulatory Commission	Staff Report		Survey identification of key issues
R-6	March 16, 2005	Impact Evaluation of the California Statewide Pricing Pilot		Charles River Associates		Summarizes the final results of the 2003-4 California statewide pilot
R-7	March 2005	Exploring the Relationship Between Demand Response and Energy Efficiency: A Review of Experience and Discussion of Key Issues	American Council for an Energy-Efficient Economy		D. York M. Kusher	Examine relationship between energy efficiency and demand response
R-8	August 2004	Electricity Markets: Consumers Could Benefit from Demand Programs, but Challenges Remain		US Government Accountability Office		Types of programs in use; benefits indicated; barriers to introduction and expansion; examples of barriers overcome

**Exhibit CTS-3**  
**Docket No. E-01345A-08-0172**

<b>Reference Number</b>	<b>Date</b>	<b>Report Title</b>	<b>Sponsor</b>	<b>Preparer</b>	<b>Personnel</b>	<b>Primary Content</b>
<b>R-9</b>	August 2004	Does Real Time Pricing Deliver Demand Response? A Case Study of Niagara Mohawk's Large Customer RTP Tariff	California Energy Commission	Ernest Orlando Lawrence Berkeley National Laboratory; Neenan Associates	C. Goldman N. Hopper O. Sezgen M. Moezzi R. Bharvirkar B. Neenan D. Pratt P. Cappers R. Boisvert	Niagara Mohawk RTP Study of 149 large C&I customers
<b>R-10</b>	June 2004	Customer Response to Day-Ahead Wholesale Market Electricity Prices: Case Study of RTP Program Experience in New York	California Energy Commission	Ernest Orlando Lawrence Berkeley National Laboratory; Neenan Associates	C. Goldman N. Hopper O. Sezgen M. Moezzi R. Bharvirkar B. Neenan D. Pratt P. Cappers R. Boisvert	Niagara Mohawk RTP Study of 149 large C&I customers

Summary of Typical Demand Response Program Effectiveness Measures

Location	Program	Program Type	Measures of Program Effectiveness					Primary Data Source
			Peak Load Reduction	Customer Bill Impacts	Customer Satisfaction	Impact of Technology	Energy Usage	
California	ADRS	CPP	27% - 51%			X		P-2, R-1
	Anaheim	PTR, CPP	12% during CP hours					R-1
	Statewide Pricing Pilot	CPPV	34.5% - 47.4%	-4% to 5.1%	33%	X		P-6 - P-8, R-1
		CPPF	12.5%	-6.0% to 8.3%	45%	X		P-6 - P-8, R-1
		TOU	4.1%	-3.0% to 4.5%	40%	X		P-6 - P-8, R-1
	Pacific Gas & Electric		18%					R-8
	San Diego Gas & Electric	Regional Wholesale Pricing	5%					R-8
Carolinass	Duke Power	RTP	8%					R-8
Florida	Gulf Power	CPP	40% - 50%					P-2, R-1, R-8
Georgia	Georgia Power	RTP	30-60%					R-8
Idaho	Idaho Power	CPP	48%					P-2, R-1
Illinois	Community Energy Cooperative	ESPP		-19.6%			-3% to -4%	R-1, R-5, R-8
Missouri	Ameren	TOU, CPP	13-35%			X		P-2, R-1
New Jersey	PSEG	TOU, CPP	12-18%					P-2, R-1, R-8
New York	Niagara Mohawk	RTP	18%		3.2 (1-5, 5 is highest)	X	X	R-9, R-10

**Exhibit CTS-4**  
**Docket No. E-01345A-08-0172**

Location	Program	Program Type	Measures of Program Effectiveness					Primary Data Source
			Peak Load Reduction	Customer Bill Impacts	Customer Satisfaction	Impact of Technology	Energy Usage	
Wisconsin	Wisconsin Public Service	TOU	12-31%					R-8
Australia	Energy Australia	CPP	20-24%					P-2, R-1
Ontario, Canada		TOU, CPP, PTR	5.7% – 25.4% load shift CP hours; 2.4% – 11.9% peak hours				-6%	P-2, R-1

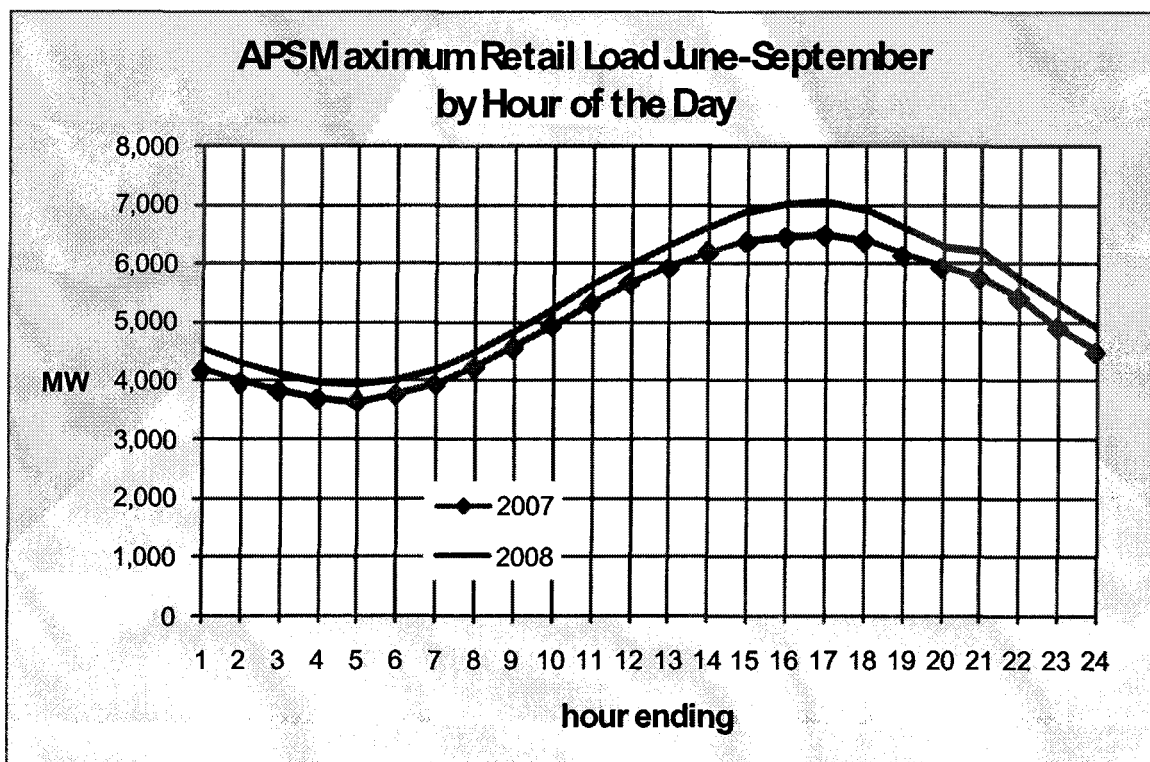
**Terms Used:**

ESPP – Energy Smart Pricing Plan  
 CPP - Critical Peak Pricing  
 CPPF – Critical Peak Pricing - Fixed  
 CPPV – Critical Peak Pricing - Variable  
 PTR – Peak Time Rebate  
 RTP – Real Time Pricing  
 TOU – Time of Use

Summary of Proposed Rates ET-SP and ET-2

Rate	Summer \$/kWh			Winter \$/kWh	
	Super Peak	On-Peak	Off-Peak	On-Peak	Off-Peak
ET-SP	\$0.49465	\$0.24465	\$0.05259	\$0.19842	\$0.05259
ET-2		\$0.24465	\$0.06131	\$0.19842	\$0.06130

APS Maximum Retail Load  
June – September 2007 - 2008



Graph shows APS' maximum retail load occurring in each hour during the summer of the year indicated. The peak load for hour n may not occur on the same day as the peak load for hour m. APS' retail peak load in 2008 occurred at 5:00 p.m. on August 1, and APS' retail peak load in 2007 occurred at 5:00 p.m. on August 13.

Source: APS response to Staff data request 22.10.

**Arizona Power Plant Air Emissions Rates 2006**  
**Metric Tons per MWh Generated**

Generation Type	CO <sub>2</sub> Emissions	SO <sub>2</sub> Emissions	NO <sub>x</sub> Emissions
Coal	0.986	0.00110	0.00175
Natural Gas	0.409	0.00000	0.00012

Source: Energy Information Administration